



Long-Term, Post-Closure Radiation Monitor



Developer: McDermott Technology, Inc. (MTI)

Contract Number: DE-AC21-92MC29103

Crosscutting Area: CMST

Subsurface
Contaminants
FOCUS AREA

Problem:

Monitoring of radionuclides at Department of Energy (DOE) waste sites is necessary to determine if there may be potential impacts to human health or the environment based on the characteristics and movement of the radionuclides present. Monitoring will likely continue long after site cleanup has been completed. This post-closure monitoring of radionuclides will require that large numbers of sensors be installed below ground surface and monitored for long time periods (30 years is typical). Existing monitoring systems are too complex and expensive to maintain in place for long time periods.

Solution:

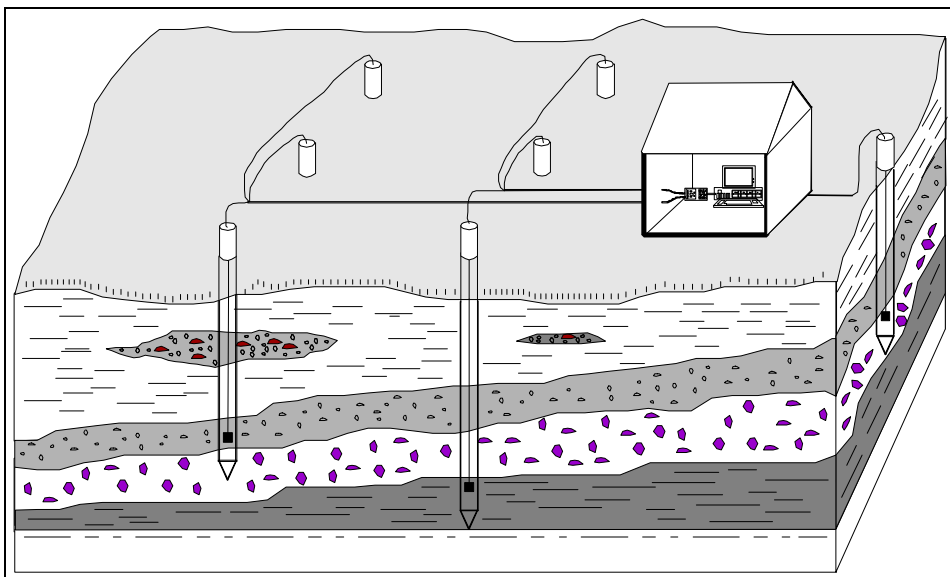
Configure commercially available components into a reliable, low-cost, multi-point system for long-term, post-closure monitoring. This system is based on gamma detection and is planned to be capable of monitoring to depths of more than fifty meters below ground level without having to drill wells. Scintillator probes are installed at each measurement location and are multiplexed to a single above-ground electronics unit. The individual scintillators will be located inside hollow tubes installed vertically or horizontally in the vadose zone at a waste site, using cone penetrometer technology.

Benefits:

- Provide in situ long-term and real-time measurement techniques for monitoring contaminant leakage.
- Each scintillator is relatively small and can be produced at low cost.
- Scintillator is passive and operates at ambient temperatures; downhole components have demonstrated reliability.
- Long lived with components readily accessible for any required maintenance without soil disturbance.
- All system components are commercial or near-commercial.

Technology:

This radiation monitoring system is based on gamma detection and is designed to be capable of monitoring large numbers of permanently installed probes. Major components of the system incorporate commercially available scintillation, detectors, and signal processing electronics. Scintillation probes are installed to depths necessary to adequately monitor a given site. These probes may be installed in existing boreholes or wells, through the use of cone penetrometer technology, or if necessary, by using standard drilling methods. These



probes will be connected to above-ground electronic components and multiplexed to a single data concentrator using RF links. The use of RF multiplexing with the specific electronic components identified for this system allows monitoring of a large number of probes. The above-ground location of most of the electronic components and the absence of below-ground components that require maintenance will minimize long-term costs.

research and development of new technologies for waste site characterization and cleanup. For information regarding this project, the DOE contact is:

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DOE's Federal Energy Technology Center supports the Environmental Management - Office of Science and Technology by contracting the

